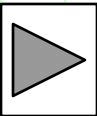


# The Periodic Table and Bonding



Physical Science  
DSHS



# The Periodic Table and Bonding

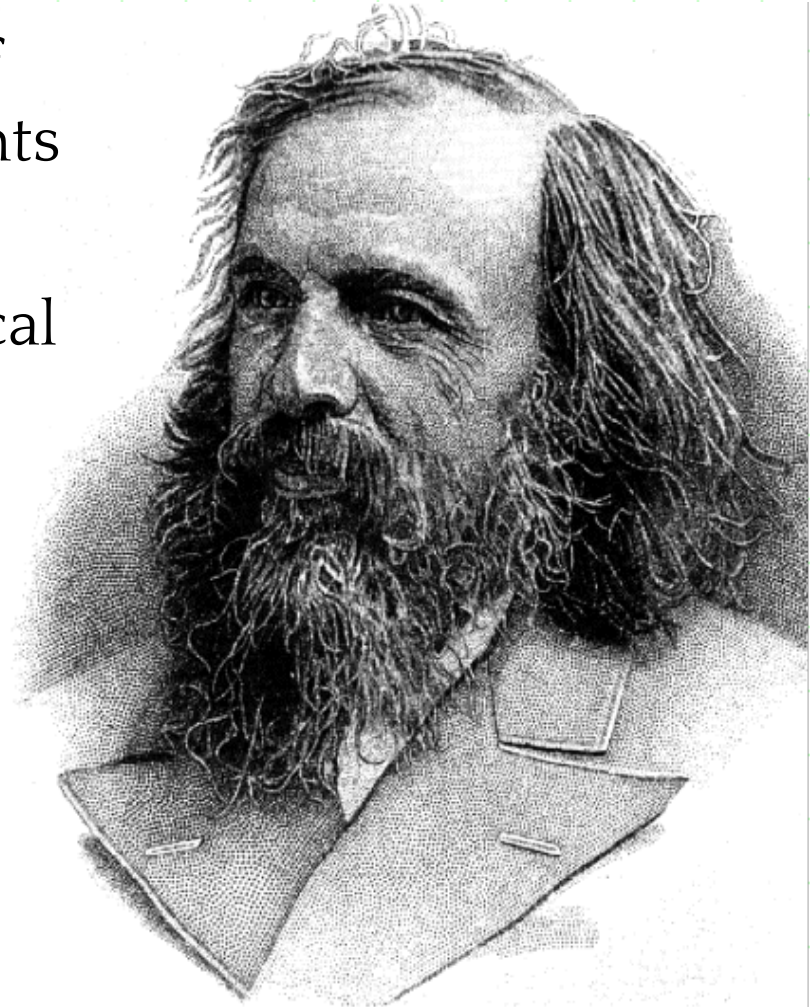
## I. The Periodic table: an organization of the elements based on similar \_\_\_\_\_ and \_\_\_\_\_

	1 IA	2 IIA	Periodic Table										13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 <b>H</b> 1.00797																	2 <b>He</b> 4.0026
2	3 <b>Li</b> 6.939	4 <b>Be</b> 9.0122											5 <b>B</b> 10.811	6 <b>C</b> 12.0112	7 <b>N</b> 14.0067	8 <b>O</b> 15.9994	9 <b>F</b> 18.9984	10 <b>Ne</b> 20.179
3	11 <b>Na</b> 22.9898	12 <b>Mg</b> 24.305	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIII B	10	11 IB	12 IIB	13 <b>Al</b> 26.9815	14 <b>Si</b> 28.086	15 <b>P</b> 30.9738	16 <b>S</b> 32.064	17 <b>Cl</b> 35.453	18 <b>Ar</b> 39.948
4	19 <b>K</b> 39.102	20 <b>Ca</b> 40.08	21 <b>Sc</b> 44.956	22 <b>Ti</b> 47.90	23 <b>V</b> 50.942	24 <b>Cr</b> 51.996	25 <b>Mn</b> 54.9380	26 <b>Fe</b> 55.847	27 <b>Co</b> 58.9332	28 <b>Ni</b> 58.71	29 <b>Cu</b> 63.54	30 <b>Zn</b> 65.37	31 <b>Ga</b> 65.37	32 <b>Ge</b> 72.59	33 <b>As</b> 74.9216	34 <b>Se</b> 78.96	35 <b>Br</b> 79.909	36 <b>Kr</b> 83.80
5	37 <b>Rb</b> 85.47	38 <b>Sr</b> 87.62	39 <b>Y</b> 88.905	40 <b>Zr</b> 91.22	41 <b>Nb</b> 92.906	42 <b>Mo</b> 95.94	43 <b>Tc</b> [99]	44 <b>Ru</b> 101.07	45 <b>Rh</b> 102.905	46 <b>Pd</b> 106.4	47 <b>Ag</b> 107.870	48 <b>Cd</b> 112.40	49 <b>In</b> 114.82	50 <b>Sn</b> 118.69	51 <b>Sb</b> 121.75	52 <b>Te</b> 127.60	53 <b>I</b> 126.904	54 <b>Xe</b> 131.30
6	55 <b>Cs</b> 132.905	56 <b>Ba</b> 137.34	57 <b>La</b> 138.91	72 <b>Hf</b> 178.49	73 <b>Ta</b> 180.948	74 <b>W</b> 183.85	75 <b>Re</b> 186.2	76 <b>Os</b> 190.2	77 <b>Ir</b> 192.2	78 <b>Pt</b> 195.09	79 <b>Au</b> 196.967	80 <b>Hg</b> 200.59	81 <b>Tl</b> 204.37	82 <b>Pb</b> 207.19	83 <b>Bi</b> 208.980	84 <b>Po</b> [210]	85 <b>At</b> [210]	86 <b>Rn</b> [222]
7	87 <b>Fr</b> [223]	88 <b>Ra</b> [226]	89 <b>Ac</b> [227]	104 <b>Ku</b> [260]	105	106	107	108	109									

# (1869)

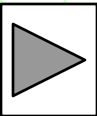
Was a Russian chemist who published the first periodic table of the elements by placing the elements in order of increasing atomic mass.

Started a new row any time chemical properties repeated so that each column had similar chemical properties



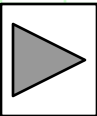
Dmitri Mendeleev.

Row	Group I — R <sub>2</sub> O	Group II — RO	Group III — R <sub>2</sub> O <sub>3</sub>	Group IV RH <sub>4</sub> RO <sub>2</sub>	Group V RH <sub>3</sub> R <sub>2</sub> O <sub>3</sub>	Group VI RH <sub>2</sub> RO <sub>3</sub>	Group VII RH R <sub>2</sub> O <sub>7</sub>	Group VIII — RO <sub>4</sub>
1	H = 1							
2	Li = 7	Be = 9.4	B = 11	C = 12	N = 14	O = 16	F = 19	
3	Na = 23	Mg = 24	Al = 27.3	Si = 28	P = 31	S = 32	Cl = 35.5	
4	K = 39	Ca = 40	— = 44	Ti = 48	V = 51	Cr = 52	Mn = 55	Fe = 56, Co = 59, Ni = 59, Cu = 63
5	(Cu = 63)	Zn = 65	— = 68	— = 72	As = 75	Se = 78	Br = 80	
6	Rb = 85	Sr = 87	?Yt = 88	Zr = 90	Nb = 94	Mo = 96	— = 100	Ru = 104, Rh = 104, Pd = 106, Ag = 108
7	(Ag = 108)	Cd = 112	In = 113	Sn = 118	Sb = 122	Te = 125	I = 127	
8	Cs = 133	Ba = 137	?Di = 138	?Ce = 140				
9								
10			?Er = 178	?La = 180	Ta = 182	W = 184		Os = 195, Ir = 197, Pt = 198, Au = 199
11	(Au = 199)	Hg = 200	Tl = 204	Pb = 207	Bi = 208			
12				Th = 231		U = 240		





Row	Group I — $R_2O$	Group II — $RO$	Group III — $R_2O_3$	Group IV $RH_4$ $RO_2$	Group V $RH_3$ $R_2O_5$	Group VI $RH_2$ $RO_3$	Group VII $RH$ $R_2O_7$	Group VIII — $RO_4$
1	H = 1							
2	Li = 7	Be = 9.4	B = 11	C = 12	N = 14	O = 16	F = 19	
3	Na = 23	Mg = 24	Al = 27.3	Si = 28	P = 31	S = 32	Cl = 35.5	
4	K = 39	Ca = 40	— = 44	Ti = 48	V = 51	Cr = 52	Mn = 55	Fe = 56, Co = 59, Ni = 59, Cu = 63
5	(Cu = 63)	Zn = 65	— = 68	— = 72	As = 75	Se = 78	Br = 80	
6	Rb = 85	Sr = 87	?Yt = 88	Zr = 90	Nb = 94	Mo = 96	— = 100	Ru = 104, Rh = 104, Pd = 106, Ag = 108
7	(Ag = 108)	Cd = 112	In = 113	Sn = 118	Sb = 122	Te = 125	I = 127	
8	Cs = 133	Ba = 137	?Di = 138	?Ce = 140				
9								
10			?Er = 178	?La = 180	Ta = 182	W = 184		Os = 195, Ir = 197, Pt = 198, Au = 199
11	(Au = 199)	Hg = 200	Tl = 204	Pb = 207	Bi = 208			
12				Th = 231		U = 240		



# Mendeleev

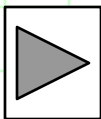
Left gaps in his list of elements to show where there was no known element to fit the pattern

First to use the periodic table to make

Not all elements fit the pattern

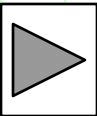
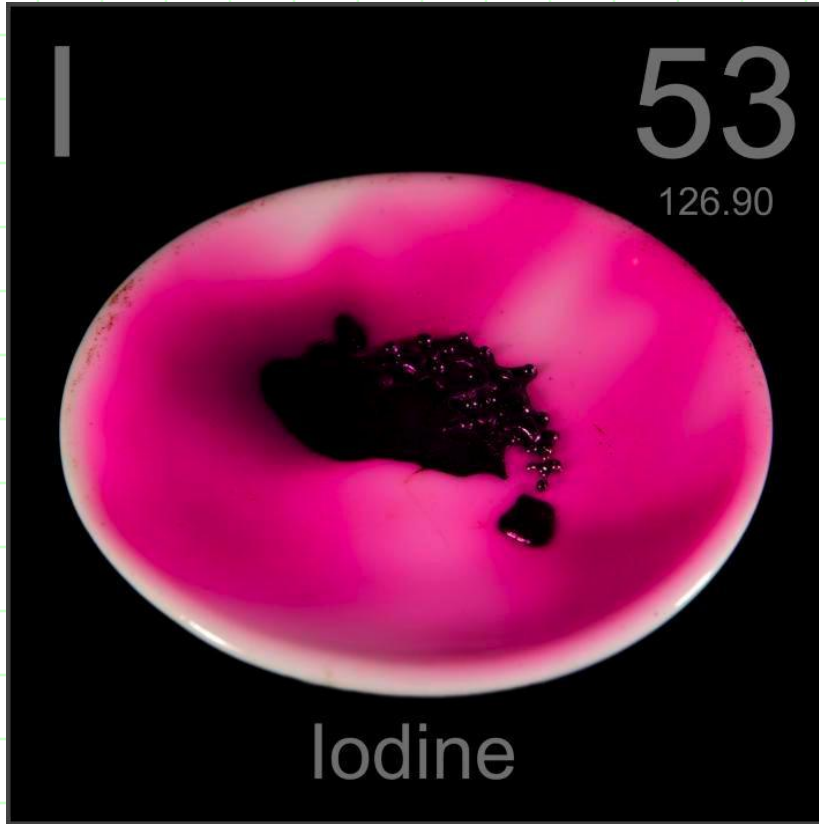
Mendeleev's Periodic Table of 1869<sup>1</sup>

H 1			Ti 50	Zr 90	? 100
			V 51	Nb 94	Ta 182
			Cr 52	Mo 96	W 186
			Mn 55	Rh 104.4	Pt 197.4
			Fe 56	Ru 104.4	Ir 198
			Ni, Co 59	Pd 106.6	Os 199
			Cu 63.4	Ag 108	Hg 200
			Zn 65.2	Cd 112	
	Be 9.4	Mg 24	? 68	U 116	Au 197?
	B 11	Al 27.4	? 70	Sn 118	
	C 12	Si 28	As 75	Sb 122	Bi 210?
	N 14	P 31	Se 79.4	Te 128?	
	O 16	S 32	Br 80	I 127	
	F 19	Cl 35.5	Rb 85.4	Cs 133	
Li 7	Na 23	K 39	Sr 87.6	Ba 137	Tl 204
		Ca 40	Ce 92		Pb 207
		? 45	La 94		
		Er? 56	Di 95		
		Yt? 60	Th 118?		
		In 75.6?			





# Mendeleev



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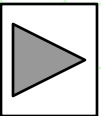
English chemist

Organized the periodic  
table by increasing

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Modern periodic table  
also organizes elements  
by increasing atomic  
number



# The Periodic Table and Bonding

- B. The Periodic Table has gone through many changes through the years.

1 H																	2 He				
3 Li	4 Be															5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg															13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr				
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe				
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn				
87 Fr	88 Ra	89 Ac	104 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110 Uun												

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr





ПЕРИОДИЧЕСКАЯ СИСТЕМА ЭЛЕМЕНТОВ  
 Д.И.МЕНДЕЛЕЕВА

The image shows a standard periodic table of elements, titled "ПЕРИОДИЧЕСКАЯ СИСТЕМА ЭЛЕМЕНТОВ Д.И. МЕНДЕЛЕЕВА". The table is organized into rows (periods) and columns (groups). Elements are color-coded: red for alkali metals, blue for alkaline earth metals, green for transition metals, and orange for non-metals. The table includes element symbols, atomic numbers, and names in Russian. A portrait of Dmitri Mendeleev is in the top right corner.

西康路 1 号 康康路 1 号

Co	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
58.933	140.907	144.240	144.912	150.358	151.964	157.254	158.925	162.500	164.930	167.259	168.930	173.054	174.967
58.933	140.907	144.240	144.912	150.358	151.964	157.254	158.925	162.500	164.930	167.259	168.930	173.054	174.967

金 剛 手 續 規 則 第 三 條



Period

Main Group

Noble Gases

	I A 1	II A 2	III A 13	IV A 14	V A 15	VI A 16	VII A 17	VIII A 18
1	1 Hydrogen <b>H</b> 1.0079						1 Hydrogen <b>H</b> 1.0079	2 Helium <b>He</b> 4.0026
2	3 Lithium <b>Li</b> 6.941	4 Beryllium <b>Be</b> 9.0122	5 Boron <b>B</b> 10.811	6 Carbon <b>C</b> 12.0112	7 Nitrogen <b>N</b> 14.0067	8 Oxygen <b>O</b> 15.9994	9 Fluorine <b>F</b> 18.9984	10 Neon <b>Ne</b> 20.179
3	11 Sodium <b>Na</b> 22.989	12 Magnesium <b>Mg</b> 24.305	13 Aluminum <b>Al</b> 26.9815	14 Silicon <b>Si</b> 28.086	15 Phosphorus <b>P</b> 30.9738	16 Sulfur <b>S</b> 32.064	17 Chlorine <b>Cl</b> 35.453	18 Argon <b>Ar</b> 39.948
4	19 Potassium <b>K</b> 39.098	20 Calcium <b>Ca</b> 40.08	31 Gallium <b>Ga</b> 69.723	32 Germanium <b>Ge</b> 72.59	33 Arsenic <b>As</b> 74.922	34 Selenium <b>Se</b> 78.96	35 Bromine <b>Br</b> 79.904	36 Krypton <b>Kr</b> 83.80
5	37 Rubidium <b>Rb</b> 85.468	38 Strontium <b>Sr</b> 87.62	49 Indium <b>In</b> 114.82	50 Tin <b>Sn</b> 118.69	51 Antimony <b>Sb</b> 121.75	52 Tellurium <b>Te</b> 127.60	53 Iodine <b>I</b> 126.904	54 Xenon <b>Xe</b> 131.30
6	55 Cesium <b>Cs</b> 132.905	56 Barium <b>Ba</b> 137.34	81 Thallium <b>Tl</b> 204.37	82 Lead <b>Pb</b> 207.19	83 Bismuth <b>Bi</b> 208.980	84 Polonium <b>Po</b> (209)	85 Astatine <b>At</b> 210*	86 Radon <b>Rn</b> 222*
7	87 Francium <b>Fr</b> 223*	88 Radium <b>Ra</b> 226**						

Key

1  
Hydrogen  
**H**  
1.0079

Atomic number  
Name  
Symbol  
Atomic weight

Color Key

Metal

Nonmetal

Noble Gases

## Transition Elements

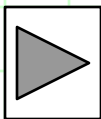
	III B 3	IV B 4	V B 5	VI B 6	VII B 7	VIII B 8	VIII B 9	VIII B 10	IB 11	II B 12
4	21 Scandium <b>Sc</b> 44.956	22 Titanium <b>Ti</b> 47.90	23 Vanadium <b>V</b> 50.942	24 Chromium <b>Cr</b> 51.996	25 Manganese <b>Mn</b> 54.938	26 Iron <b>Fe</b> 55.847	27 Cobalt <b>Co</b> 58.933	28 Nickel <b>Ni</b> 58.71	29 Copper <b>Cu</b> 63.546	30 Zinc <b>Zn</b> 65.38
5	39 Yttrium <b>Y</b> 88.905	40 Zirconium <b>Zr</b> 91.22	41 Niobium <b>Nb</b> 92.906	42 Molybdenum <b>Mo</b> 95.94	43 Technetium <b>Tc</b> 99**	44 Ruthenium <b>Ru</b> 101.07	45 Rhodium <b>Rh</b> 102.905	46 Palladium <b>Pd</b> 106.4	47 Silver <b>Ag</b> 107.868	48 Cadmium <b>Cd</b> 112.40
6	57 Lanthanum <b>La</b> 138.91	72 Hafnium <b>Hf</b> 178.49	73 Tantalum <b>Ta</b> 180.948	74 Tungsten <b>W</b> 183.85	75 Rhenium <b>Re</b> 186.2	76 Osmium <b>Os</b> 190.2	77 Iridium <b>Ir</b> 192.2	78 Platinum <b>Pt</b> 195.09	79 Gold <b>Au</b> 196.967	80 Mercury <b>Hg</b> 200.59
7	89 Actinium <b>Ac</b> 227*	104 Rutherfordium <b>Rf</b> 261*	105 Dubnium <b>Db</b> 262*	106 Seaborgium <b>Sg</b> (263)	107 Bohrium <b>Bh</b> 262*	108 Hassium <b>Hs</b> 265*	109 Meitnerium <b>Mt</b> 266*	110	111	112

## Inner Transition Elements

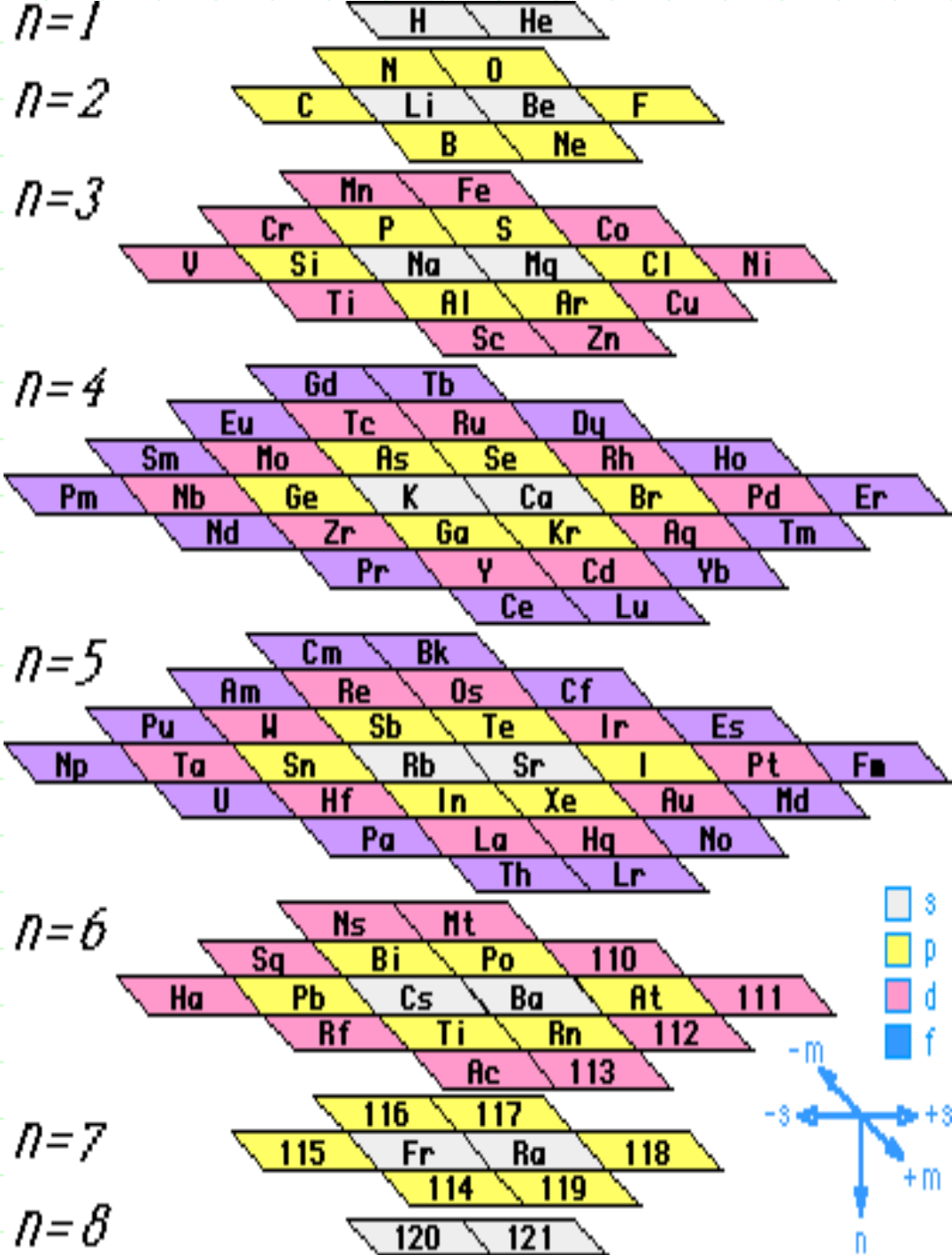
58 Cerium <b>Ce</b> 140.12	59 Praseodymium <b>Pr</b> 140.907	60 Neodymium <b>Nd</b> 144.24	61 Promethium <b>Pm</b> 147**	62 Samarium <b>Sm</b> 150.35	63 Europium <b>Eu</b> 151.96	64 Gadolinium <b>Gd</b> 157.25	65 Terbium <b>Tb</b> 158.925	66 Dysprosium <b>Dy</b> 162.50	67 Holmium <b>Ho</b> 164.930	68 Erbium <b>Er</b> 167.26	69 Thulium <b>Tm</b> 168.934	70 Ytterbium <b>Yb</b> 173.04	71 Lutetium <b>Lu</b> 174.97
90 Thorium <b>Th</b> 232.038	91 Protactinium <b>Pa</b> 231.04	92 Uranium <b>U</b> 238.03	93 Neptunium <b>Np</b> 237*	94 Plutonium <b>Pu</b> 242**	95 Americium <b>Am</b> 243.06	96 Curium <b>Cm</b> 247*	97 Berkelium <b>Bk</b> 249**	98 Californium <b>Cf</b> 251*	99 Einsteinium <b>Es</b> 254*	100 Fermium <b>Fm</b> 257.095	101 Mendelevium <b>Md</b> 258.10	102 Nobelium <b>No</b> 259.101	103 Lawrencium <b>Lr</b> 260.105

isotope with longest half-life  
better known isotope

H He																															
Li Be		B	C	N	O	F	Ne																								
Na Mg		Al	Si	P	S	Cl	Ar																								
K Ca Sc		Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr															
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe														
Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112						







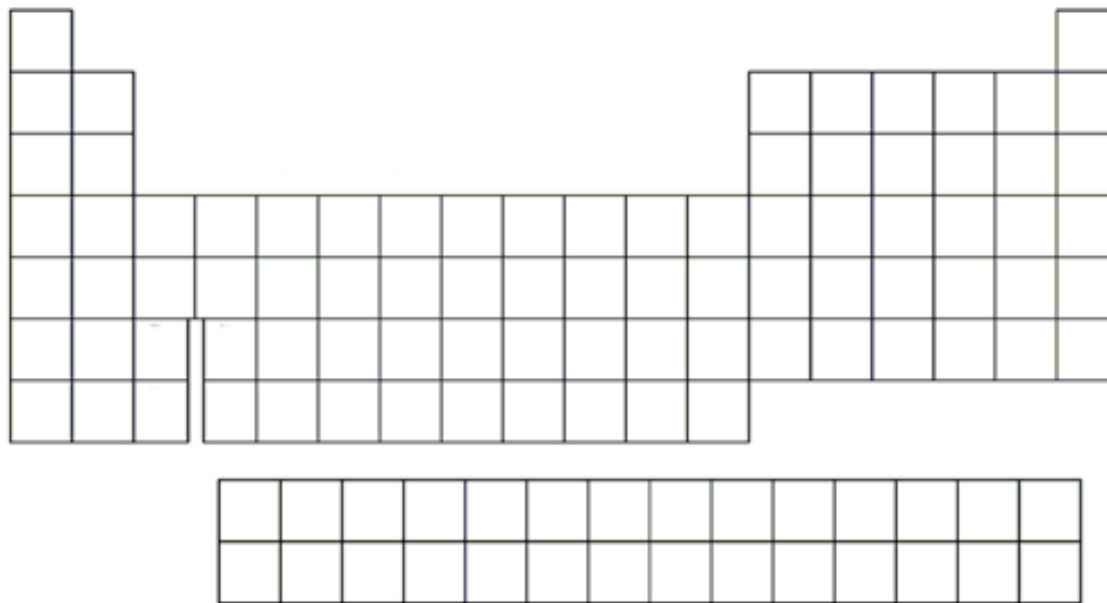


# The Periodic Table and Bonding

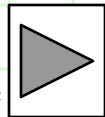
II. What information is obtained from the table?

A. Elements arranged by increasing atomic number

4A	5A	6A
<div>6</div> <div>C</div> <div>carbon</div> <div>2.01</div> <div>14</div>	<div>7</div> <div>N</div> <div>nitrogen</div> <div>14.01</div> <div>15</div>	<div>8</div> <div>O</div> <div>oxygen</div> <div>16.00</div> <div>16</div>



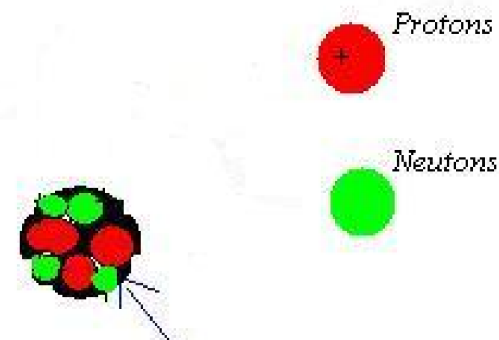
A blank periodic table grid with 7 rows and 18 columns. The first two rows are split into two blocks of 2 and 6 columns each, with a gap of 10 columns between them. The remaining five rows are continuous blocks of 18 columns each.





# The Periodic Table and Bonding

1. This order usually coincides with increasing atomic



Periodic Table of the Elements																	
					Cr			Co	Ni				Ge				
					Mo				Pd	Ag			Sn				

Nucleus

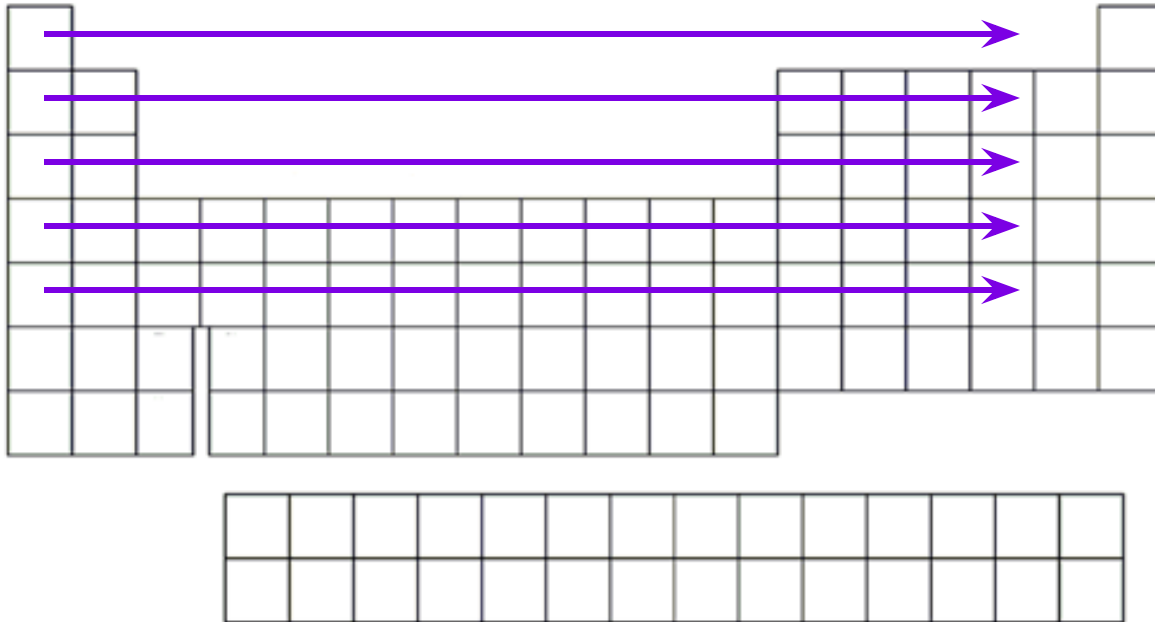


# The Periodic Table and Bonding

B. isoelectronic – elements have same number of shells.

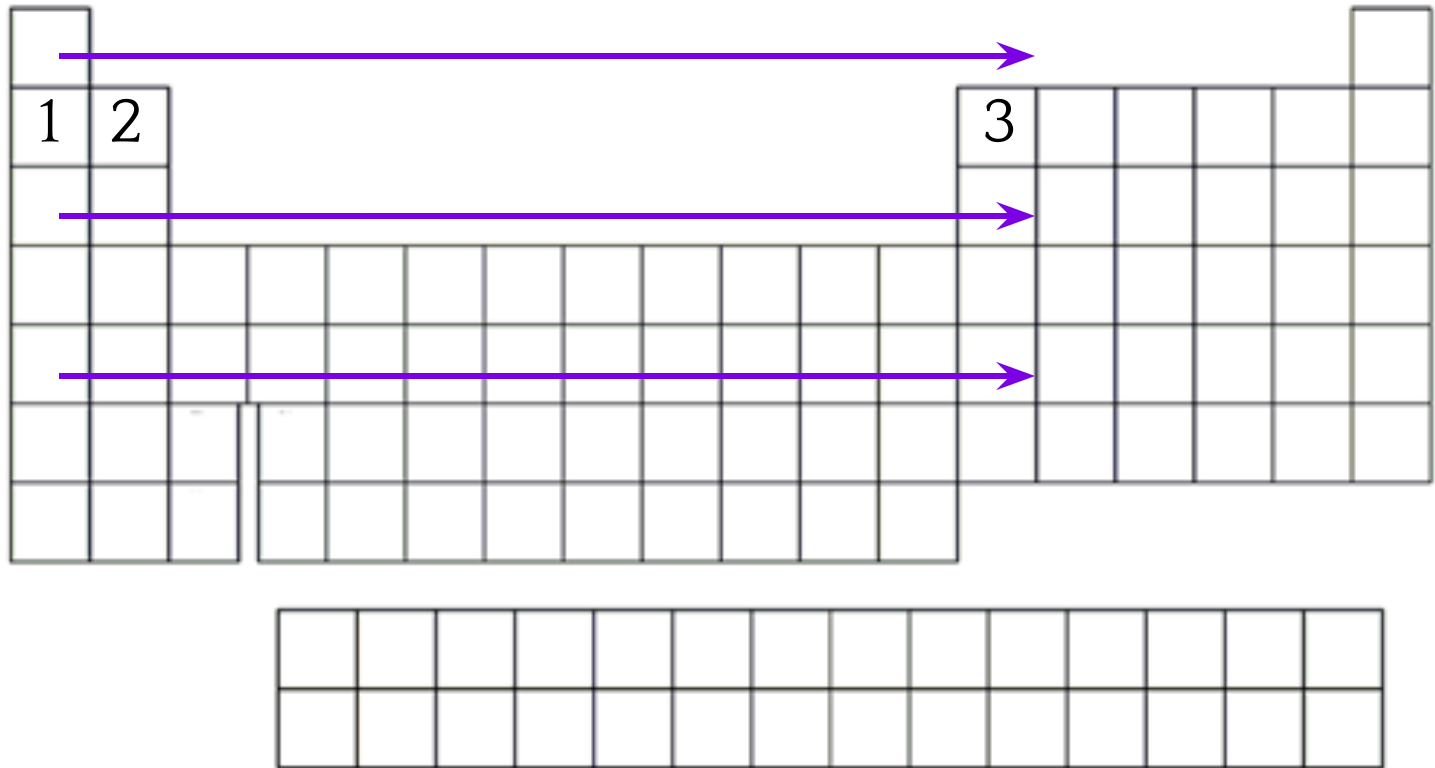
1. The different rows called columns

a. **Period number is shell where valence electrons are found**



# The Periodic Table and Bonding

2. \_\_\_\_\_ of elements decreases going across a period due to the \_\_\_\_\_ in valence electrons



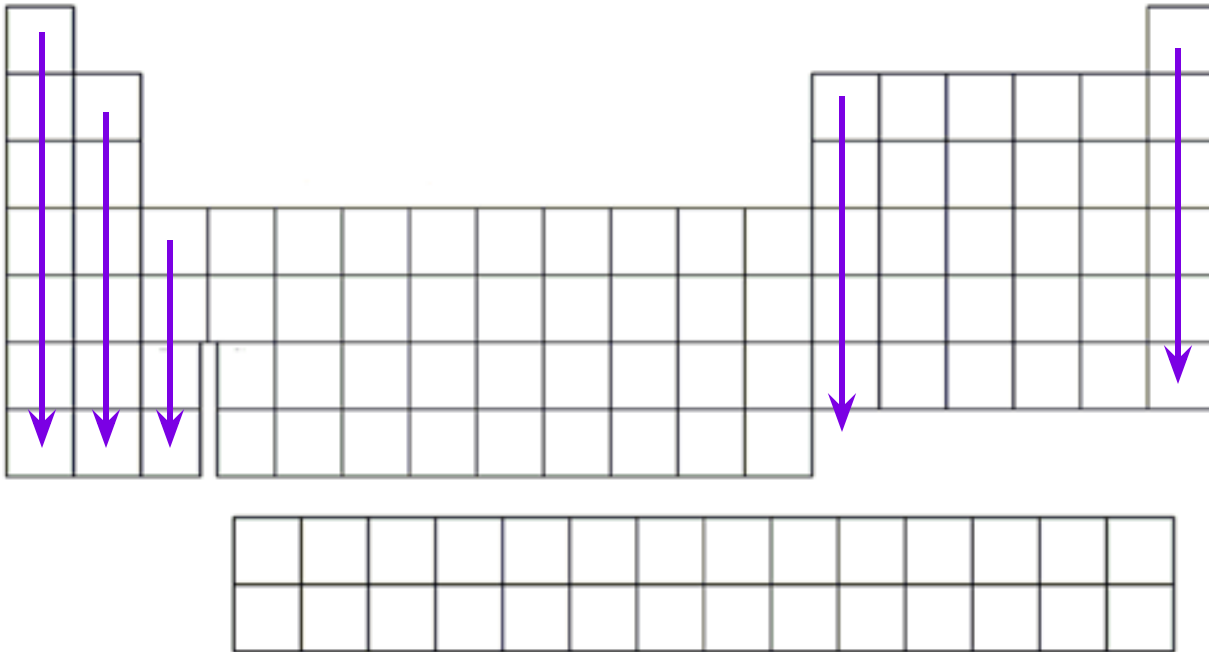


# The Periodic Table and Bonding

C. Group - elements have same number of valence electrons.

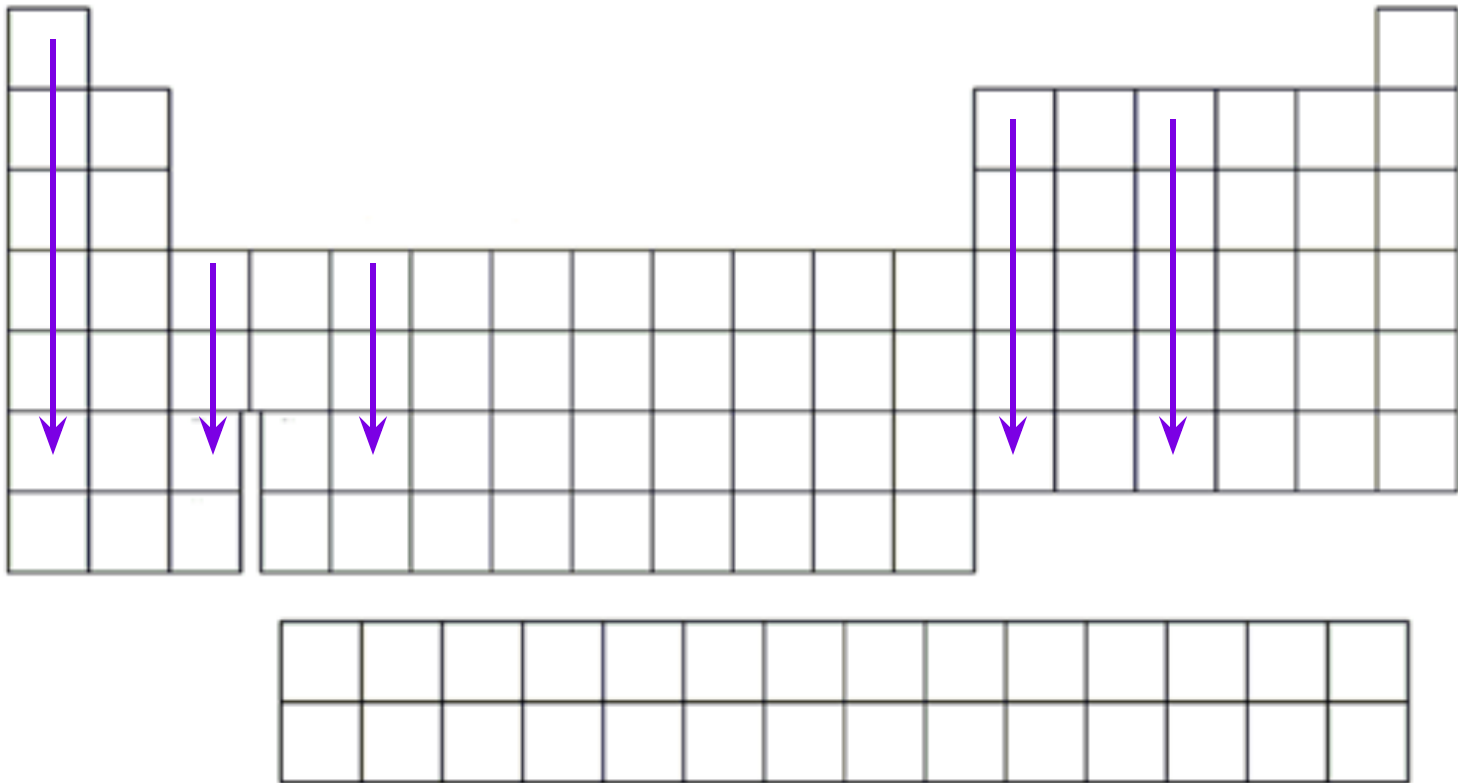
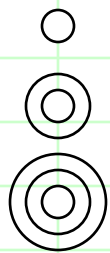
1. Columns are called primary key or

a. **Elements have similar properties**

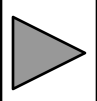


# The Periodic Table and Bonding

2. Reactivity of elements increase going  
----- a family due to the  
additional -----

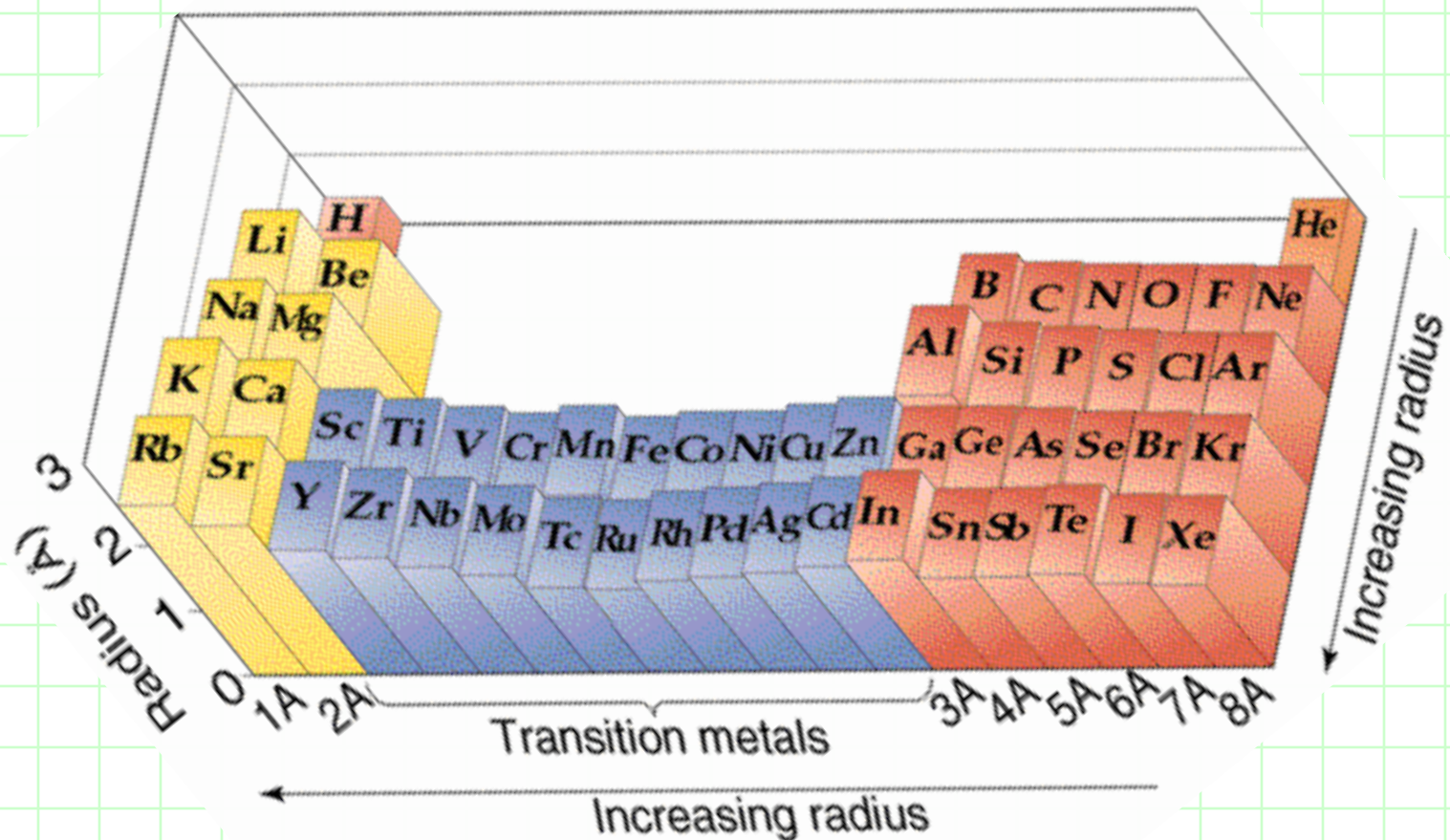


# Notable families of the Periodic Table and some important Properties:



# The Periodic Table and Bonding

- G. Atomic \_\_\_\_\_: Size of atom increases \_\_\_\_\_ a family and decreases across a row





	IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA
Period 1	H							He
Period 2	Li	Be	B	C	N	O	F	Ne
Period 3	Na	Mg	Al	Si	P	S	Cl	Ar
Period 4	K	Ca	Ga	Ge	As	Se	Br	Kr
Period 5	Rb	Sr	In	Sn	Sb	Te	I	Xe
Period 6	Cs	Ba	Tl	Pb	Bi	Po	At	Rn

# The Periodic Table and Bonding

The diagram shows a periodic table with the following color-coding and labels:

- Yellow:** Groups 1A and 2A.
- Pink:** Groups 3A through 10A.
- Orange:** Groups 11A through 18A.
- Cyan:** A diagonal line of elements from Group 3A, Period 4 to Group 16A, Period 6.

Labels and arrows indicate specific families:

- Boron Family:** Points to Group 3A (Boron, Aluminum, Gallium, Indium, Thallium).
- Nitrogen Family:** Points to Group 15A (Nitrogen, Phosphorus, Arsenic, Antimony, Bismuth).

Other labels include group numbers (1A to 18A) and period numbers (1 to 7) in blue and red text.

	1A	2A											13A	14A	15A	16A	17A	18A
			3A	4A	5A	6A	7A	8	9	10	11A	12A						
1																		
2																		
3																		
4																		
5																		
6																		
7																		

23

3.3 Periodic Table

9.17.00 1:37 PM

# The Periodic Table and Bonding

- Nonmetals
- Metals
- Metalloids
- Noble gases

The metals, nonmetals, and metalloids

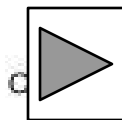
IA 1 H	IIA 4 Be											IIIA 5 B	IVA 6 C	VA 7 N	VIA 8 O	VIIA 9 F	VIIIA 10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub		114		116		118

Rare earth elements

Lanthanides

Actinides

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr



# The Periodic Table and Bonding

## F. Physical Properties

1. \_\_\_\_\_ – Left of stair step
2. \_\_\_\_\_ – right of stair step
3. \_\_\_\_\_ – on stair step

	1 IA	2 IIA														13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1																					
2																					
3			3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIII	10	11 IB	12 IIB									
4																					
5																					
6																					
7																					

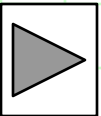
**Metals**

**Non metals**

# Metals, Nonmetals, and Semiconductors

----- - an element that is shiny and can conduct heat and electricity

- Ductile (can be drawn into wires)
- Malleable (easily shaped or formed)
- All the metals (except Hydrogen) are to the left of the table



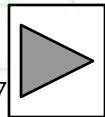


# Metals, Nonmetals, and Semiconductors

----- - an element that conducts heat and electricity poorly (sometimes called insulators)

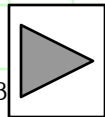
-often dull and brittle

-examples include oxygen, carbon, and helium



# Metals, Nonmetals, and Semiconductors

- Semiconductors/\_\_\_\_\_** – share properties with metals and nonmetals
- can conduct electricity under certain conditions
  - Boron, Silicon, Germanium, Arsenic, Antimony, Tellurium



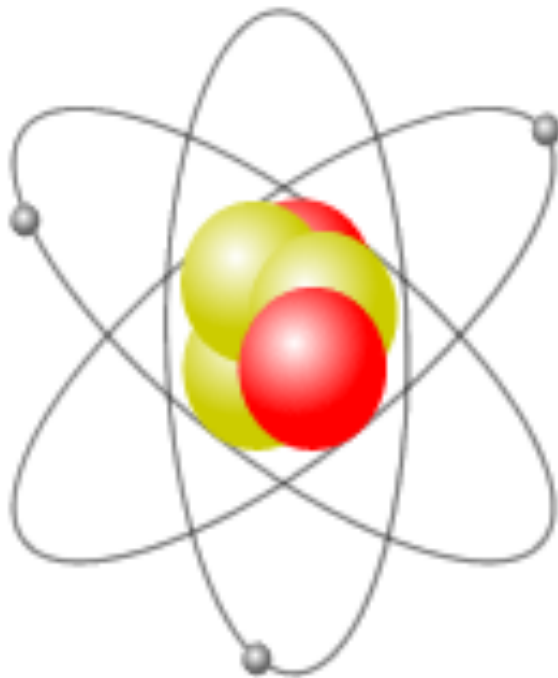
# The Periodic Table and Bonding

## II. Bonding

A. \_\_\_\_\_: Atoms w/ positive or negative charge

1. \_\_\_\_\_: **(-) ion with a negative charge.**

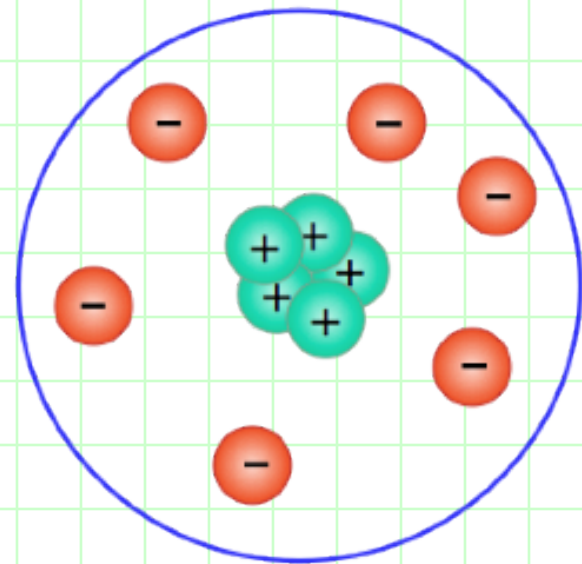
a. **atom w/ more electron(s) than it normally has in neutral state!**



Negative Ion

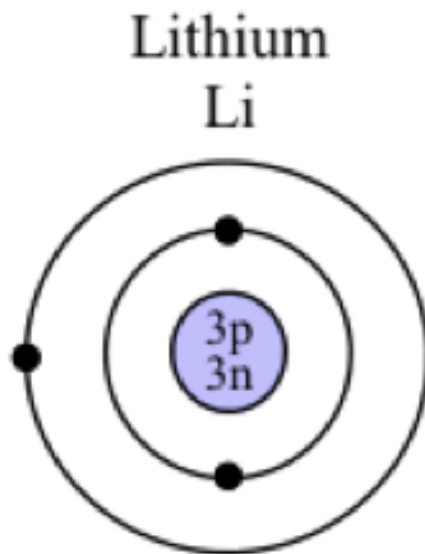
2 Protons

3 Electrons



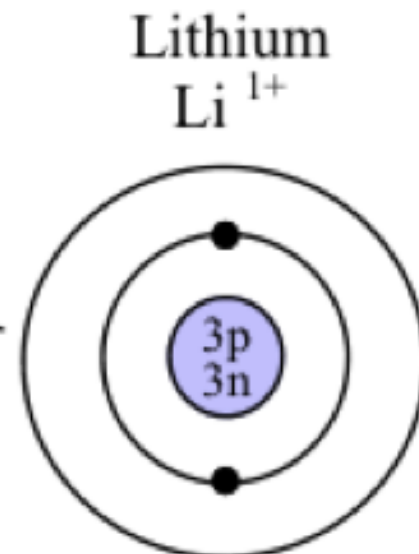
# The Periodic Table and Bonding

2. \_\_\_\_\_ : (+) ion with a positive charge.
- a. atom w/ less electron(s) than it normally has in neutral state!



3 protons (+3)  
3 electrons (-3)  
 $+3 - 3 = 0$   
Neutral atom!

Loses an  
electron

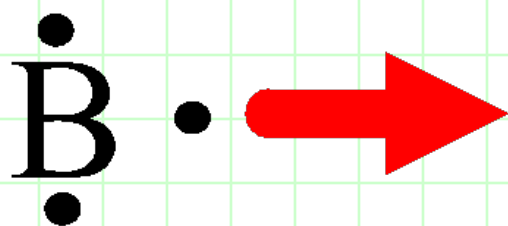


3 protons (+3)  
2 electrons (-2)  
 $+3 - 2 = +1$   
positive ion!

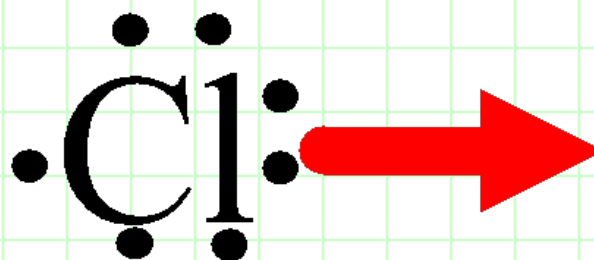
Elements ionize to the closest full shell/noble gas



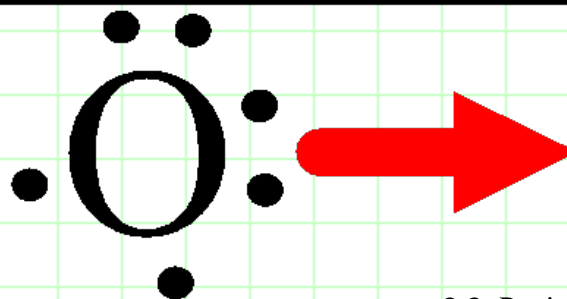
Charge of Na



Charge of B



Charge of Cl



Charge of O



West (South) <b>METALS</b>	Mid-plains <b>METALLOID</b>	East (North) <b>NON-METALS</b>
Alkali Alkaline Transition		Noble gas Halogens Calcogens
These elements tend to <b>give up</b> <b>e<sup>-</sup></b> and form <b>CATIONS</b>	These elements will give up e <sup>-</sup> or accept e <sup>-</sup>	These elements tend to <b>accept</b> <b>e<sup>-</sup></b> and form <b>ANIONS</b>

West (South) <b>METALS</b>	Mid-plains <b>METALLOID</b>	East (North) <b>NON-METALS</b>
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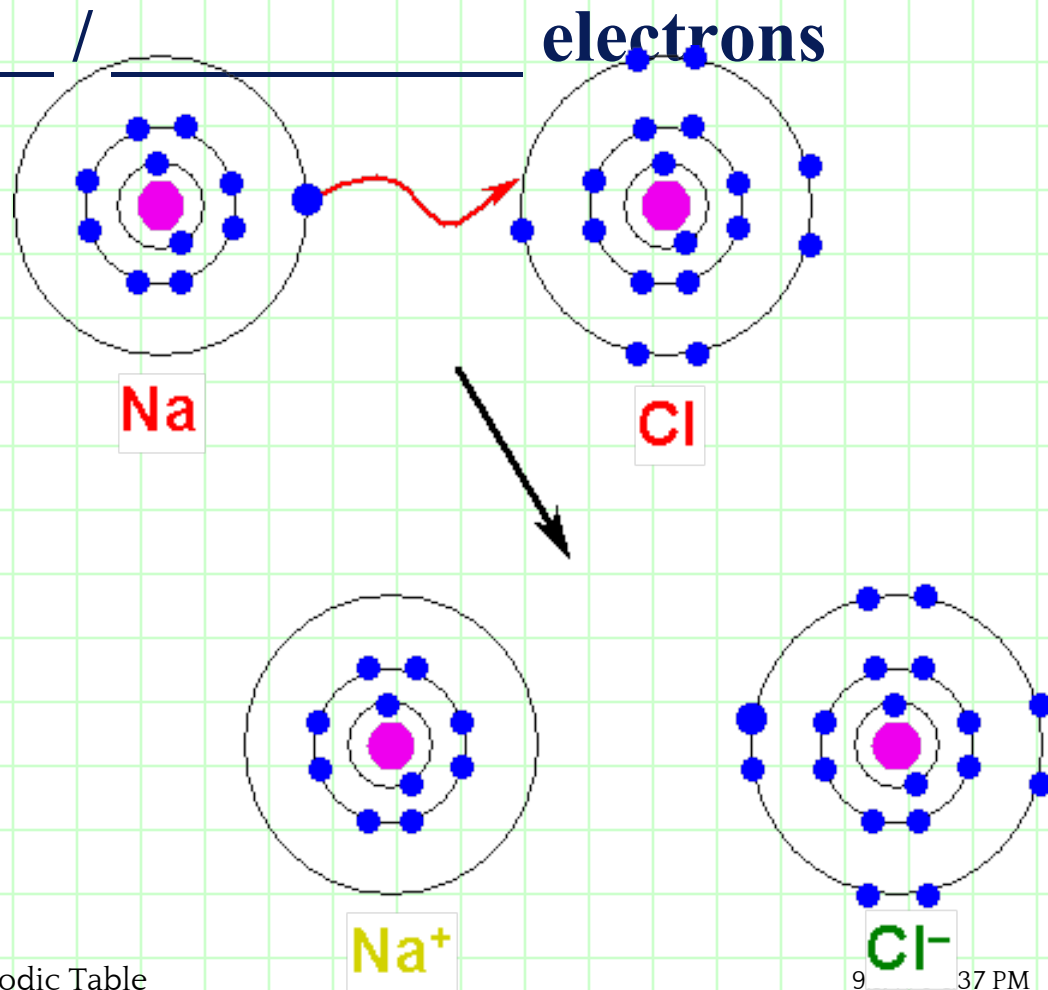
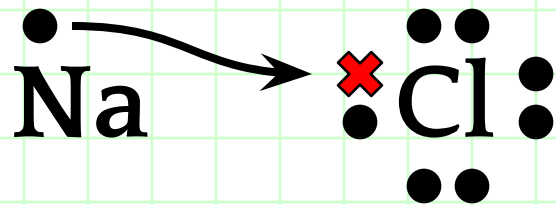
West (South) <b>METALS</b>	Mid-plains <b>METALLOID</b>	East (North) <b>NON-METALS</b>
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# The Periodic Table and Bonding

## C. Ionic Bonding : The bonding of a metal & non - mental.

### 1. Elements



# The Periodic Table and Bonding

2. Ionic bonds typically occur between families 1 & 7, 2 & 6, or 3 & 5

	$\dot{\text{X}}$	Valence electrons						Noble	
1 Ring -->	H	$\dot{\text{X}}\cdot$	$\dot{\text{X}}\cdot$	$\cdot\dot{\text{X}}\cdot$	$\cdot\ddot{\text{X}}\cdot$	$\cdot\ddot{\text{X}}:$	$\cdot\ddot{\text{X}}:$	$\ddot{\text{X}}$	<-- He
2 Rings -->	Li	Be	B	C	N	O	F	$:\ddot{\text{X}}:$	<-- Ne
3 Rings -->	Na	Mg	Al	Si	P	S	Cl	$:\ddot{\text{X}}:$	<-- Ar
4 Rings -->	K	Ca	3	4	5	6	7	8	
	1	2	Valence electrons						

# The Periodic Table and Bonding

**K**

**Br**



# The Periodic Table and Bonding

Li O

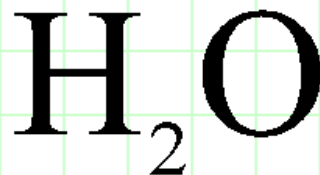
# The Periodic Table and Bonding

**Mg F**

# The Periodic Table and Bonding

## 1. Compound vs Molecule

a. Compound: 2 or more elements combined in fixed proportions



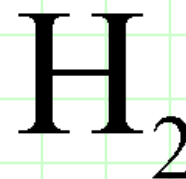
Or



b. Molecule: particle consisting of 2 or more atoms that are bonded together

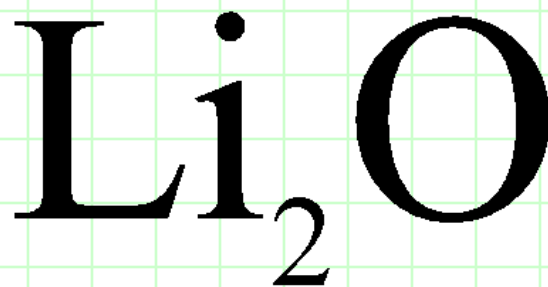
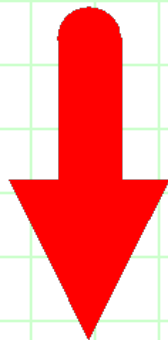
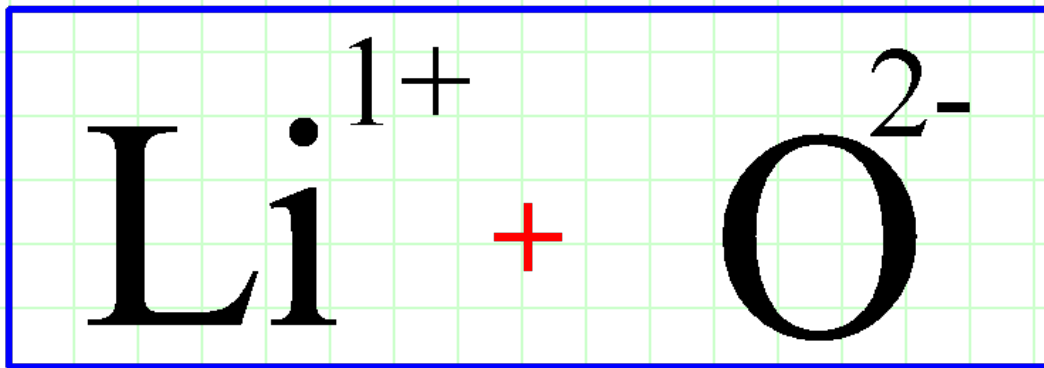


Or

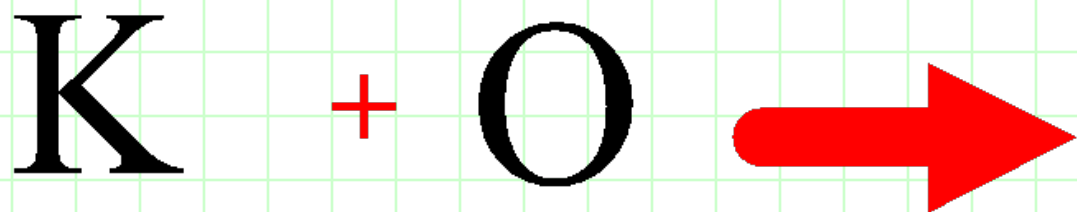


# The Periodic Table and Bonding

## Ion Criss-Cross



# Ion Criss-Cross Practice



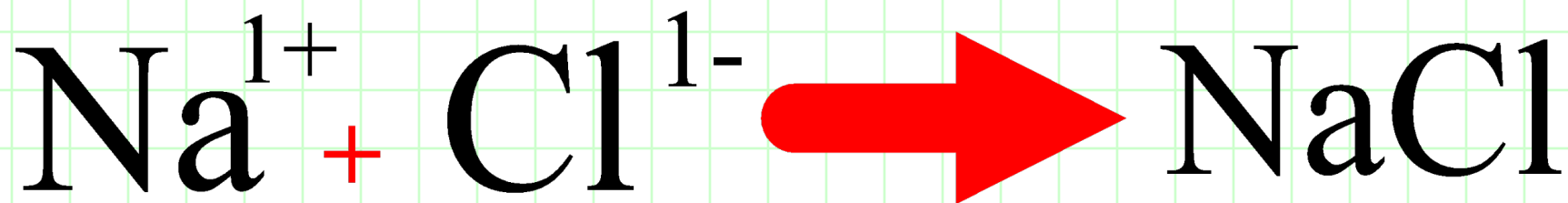


# The Periodic Table and Bonding

D. Chemical Reactions result from bonded ions

1. **5 most common reactions**

a. **Synthesis Reaction**



+

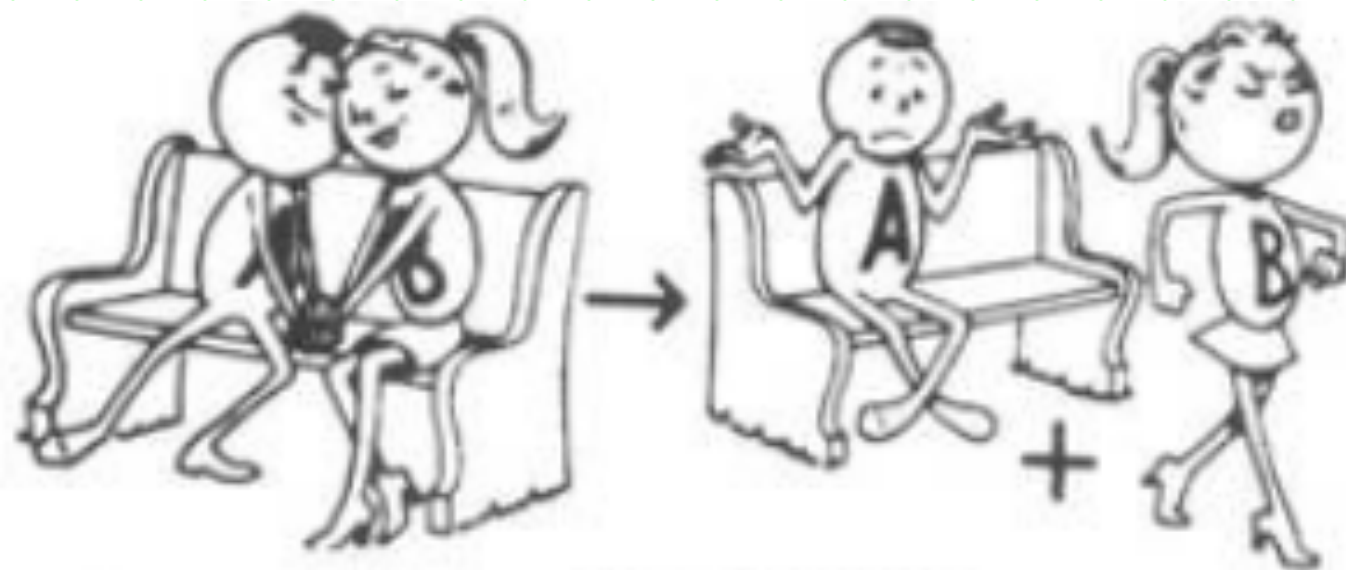
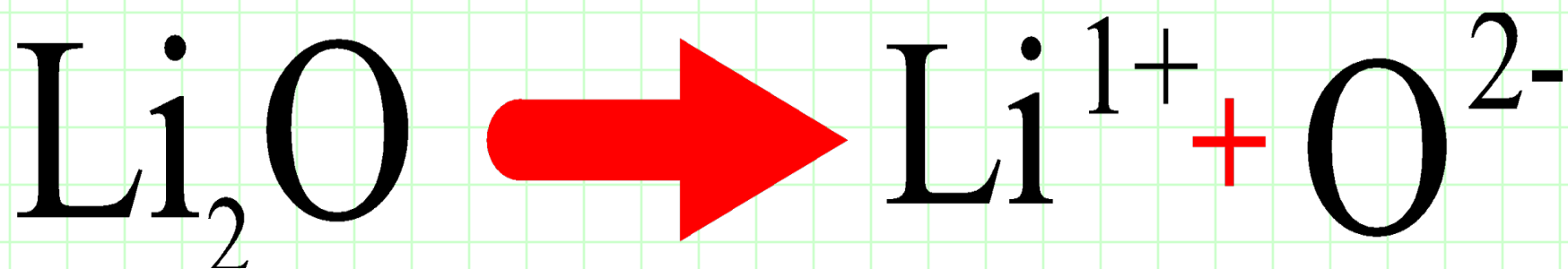


=



# The Periodic Table and Bonding

## b. Decomposition Reaction



Decomposition.

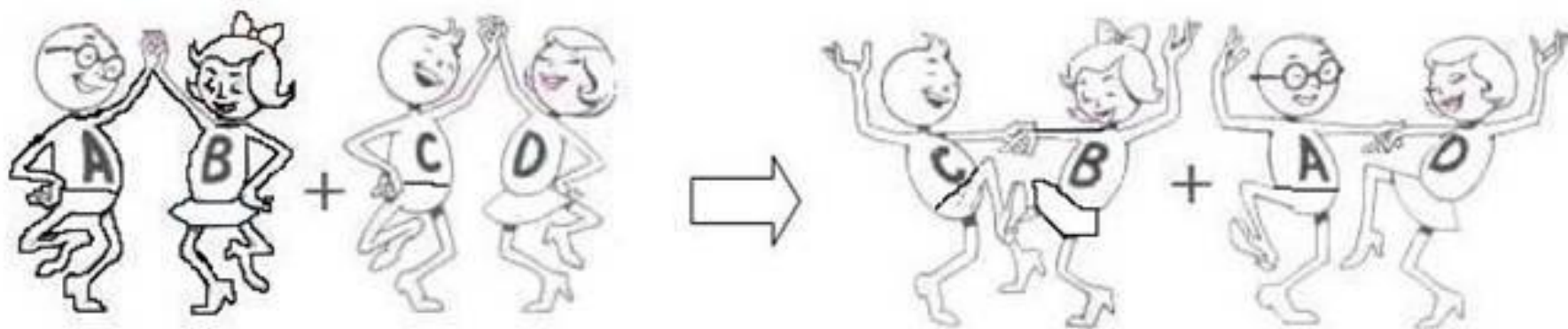
# The Periodic Table and Bonding

## c. Single - Replacement Reaction



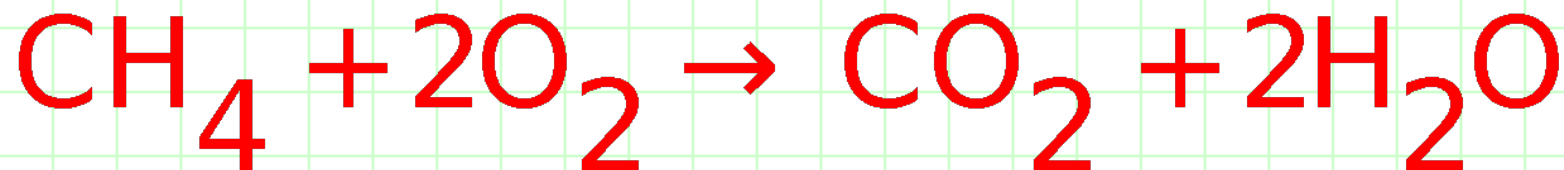
# The Periodic Table and Bonding

## d. Double - Replacement Reaction



# The Periodic Table and Bonding

## e. Combustion Reaction

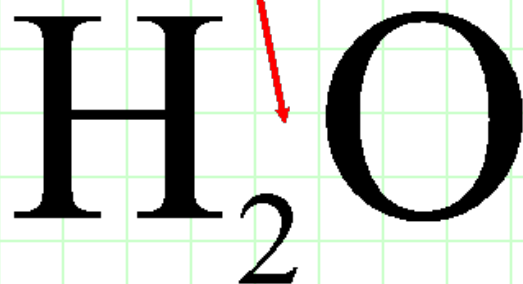




# The Periodic Table and Bonding

**B. Subscripts:** shows the number of atoms of a particular element that it follows.

Comes from writing the formula ----- you do not have the power to change the subscript!!!

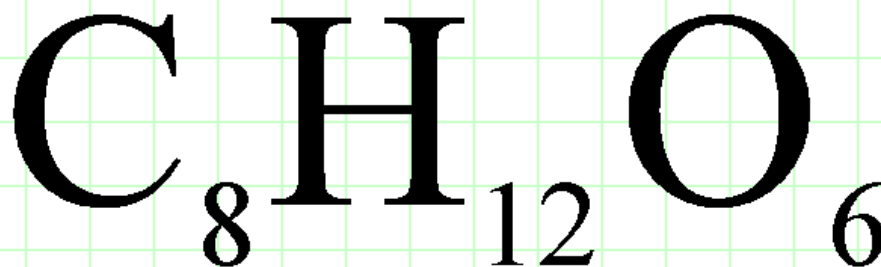


**# of H=**

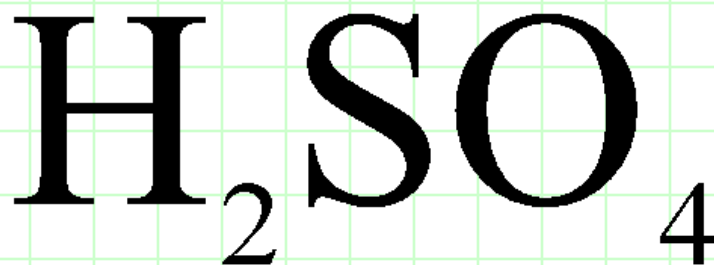
**# of O=**

# The Periodic Table and Bonding

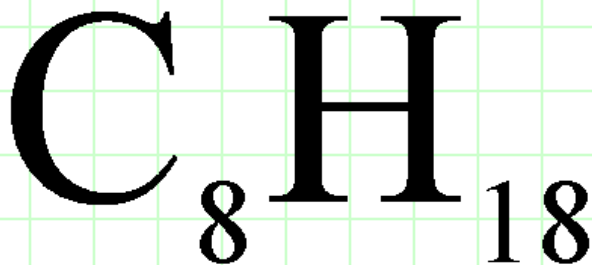
## Subscript Practice



# of C=  
# of H=  
# of O=



# of H=  
# of S=  
# of O=



# of C=  
# of H=

# The Periodic Table and Bonding

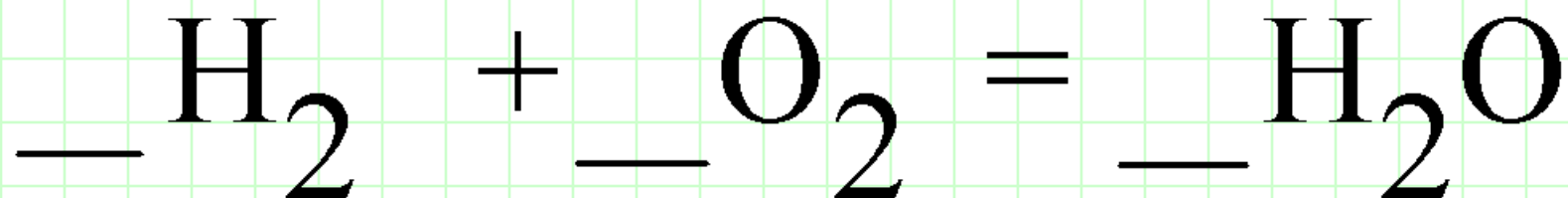
Chemical Equations must be balanced  
due to the conservation of mass.

**MATTER CANNOT BE \_\_\_\_\_  
or \_\_\_\_\_ only rearranged!!!**

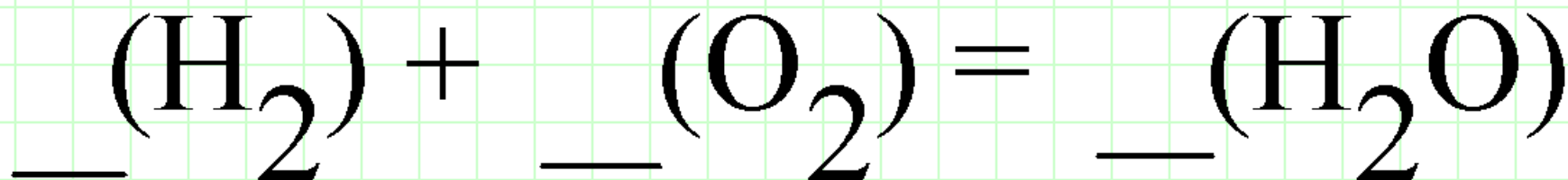
# The Periodic Table and Bonding

## Balancing Equations!!!

YOU DO HAVE POWER TO CHANGE A  
COEFFICIENT!!

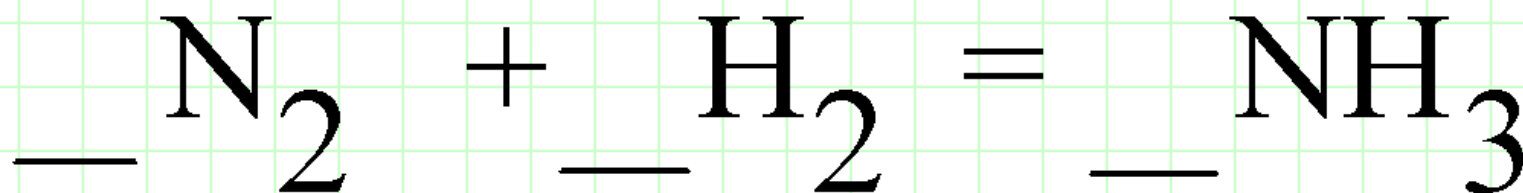


OR THINK OF IT THIS WAY!



# The Periodic Table and Bonding

## BALANCING EQUATIONS PRACTICE!



Reactants

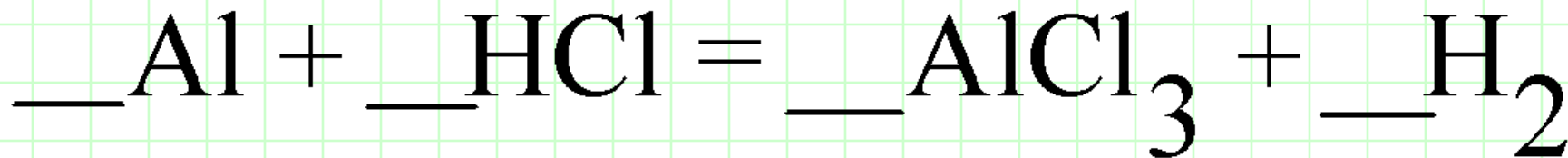
N =

H =

Products

N =

H =



Reactants

Al =

H =

Cl =

Products

Al =

H =

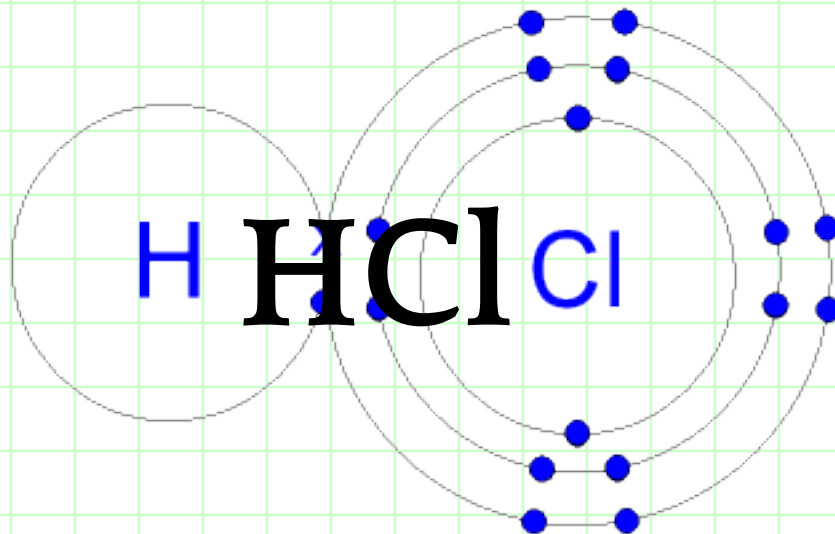
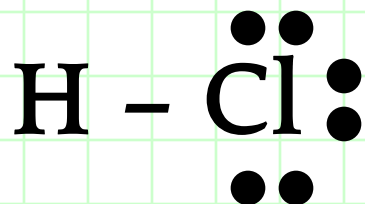
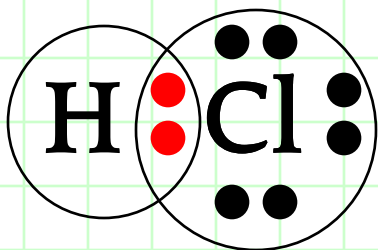
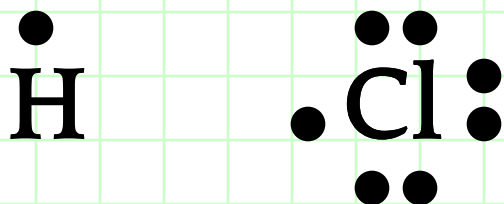
Cl =



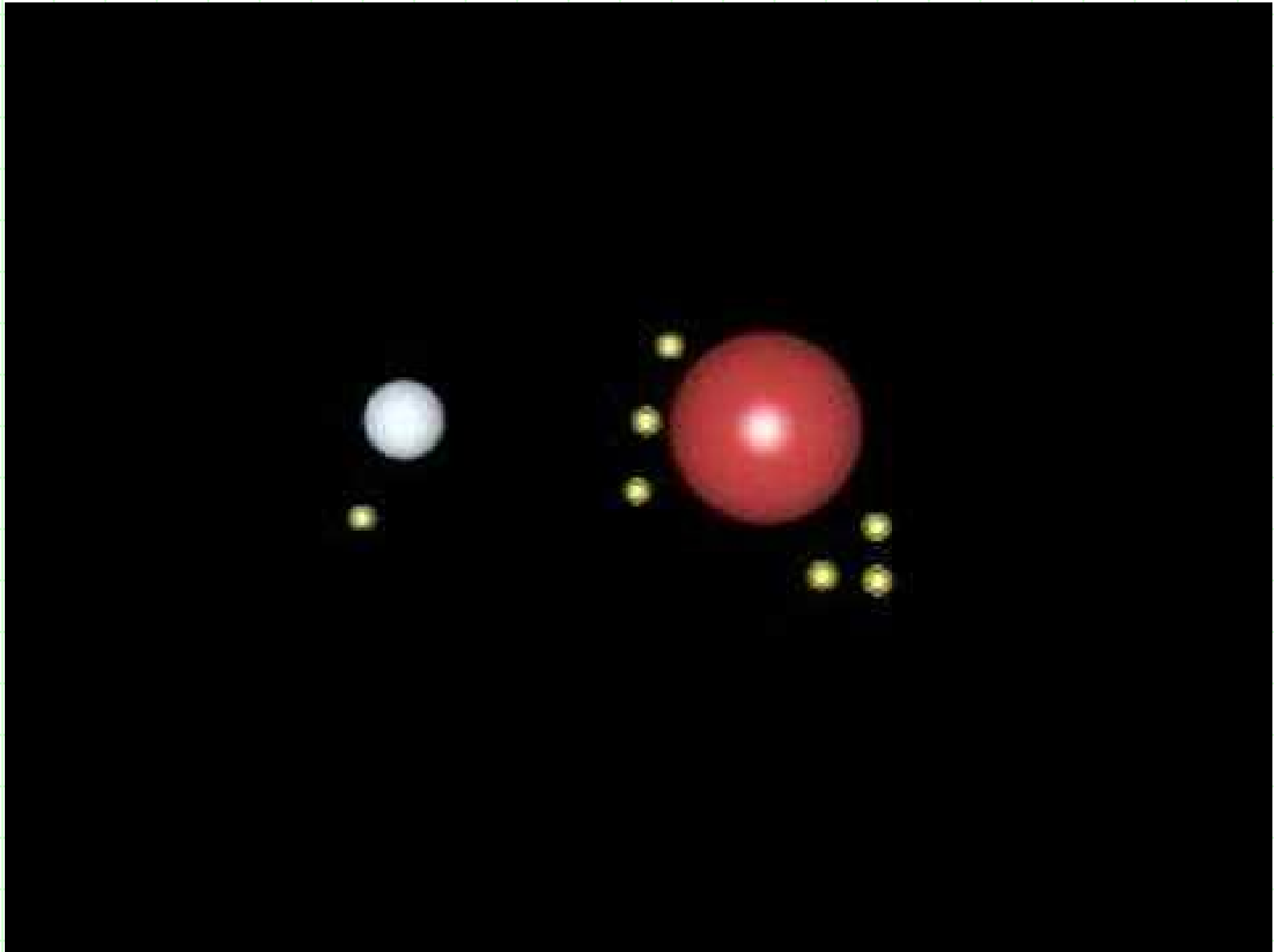
# The Periodic Table and Bonding

## E. Covalent Bonding : The bonding of a non – metal and non – metal

1. Atoms                      valence electrons.

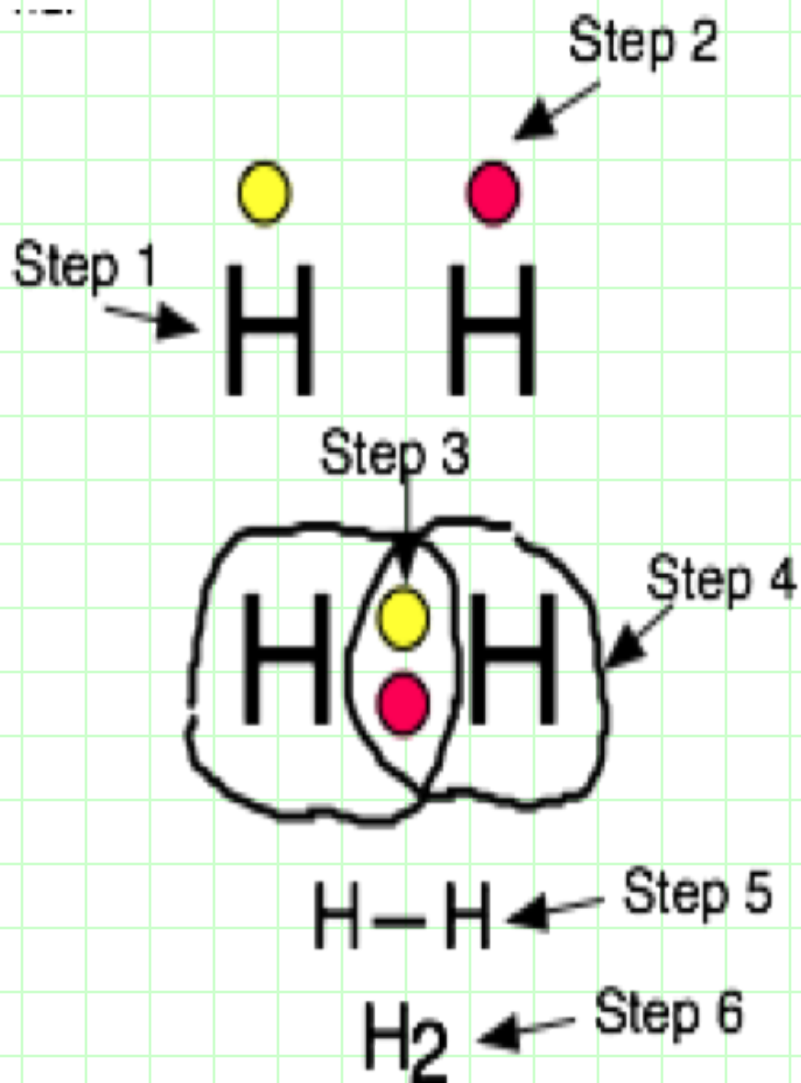


# The Periodic Table and Bonding



Ionic-and-covalent-bonding-animation

# The Periodic Table and Bonding

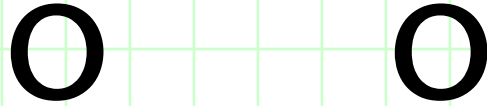


**F F**

# The Periodic Table and Bonding

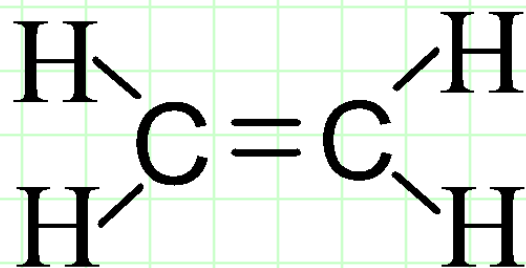
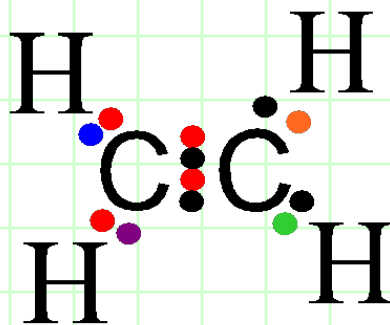
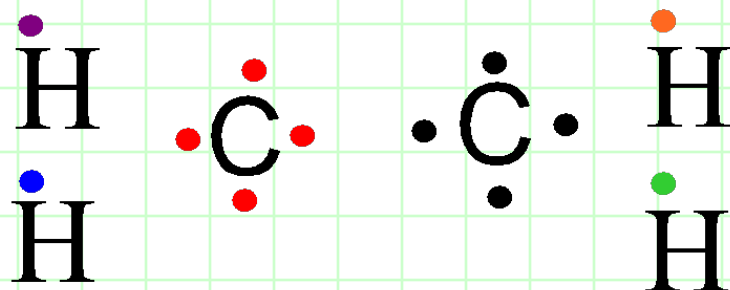


# The Periodic Table and Bonding



# The Periodic Table and Bonding

Double Bond





# The Periodic Table and Bonding

**N**

**N**

# The Periodic Table and Bonding

Tripple Bond

